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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,996	02/05/2007	Michiel T. Kreutzer	6361 1A	6871
109 7590 04/09/2010 The Dow Chemical Company P.O. BOX 1967 Midland, MI 48641				
EXAMINER HANLEY, SUSAN MARIE				
ART UNIT		PAPER NUMBER		
1651				
MAIL DATE		DELIVERY MODE		
04/09/2010		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/589,996

**Applicant(s)**

KREUTZER ET AL.

**Examiner**

SUSAN HANLEY

**Art Unit**

1651

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 January 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 9 and 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-14, 16 and 17 is/are rejected.
- 7) ☒ Claim(s) 2, 9, 15 and 18-20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ ~~Notice of Informal Patent Application~~
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

Applicant's election without traverse of the specie of claim 8, wherein the catalyst is an enzyme, in the reply filed on 06/01/2009 is again acknowledged.

Claims 9 and 18-20 stand withdrawn from further consideration.

Claims 1-8 and 10-17 are under examination.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Response to Arguments***

***Claim Rejections - 35 USC § 103***

Claims 1, 3-8, 12 and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Duncombe et al (US 4,430,348) in view of Kobayashi (Sho58-150322; cited in the IDS filed 01/22/2007) in further in view of Bliss et al. (US 2005/0159308).

Claims 1, 3-8, 12 and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (Sho58-150322; cited in the IDS filed 01/22/2007) in view of Bliss et al. (US 2005/0159308).

Applicant argues that Bliss is concerned only with catalyst supports for cleaning gaseous exhaust such as catalytic converters and diesel particulate filters and that substrates are to be rendered hydrophobic so that the catalyst does not penetrate into the walls of the honeycomb. Applicant asserts that the crudeness layer disclosed by

Kobayashi (which is interpreted to mean roughness) is fixed onto the walls of the honeycomb and that the enzyme is fixed onto the crudeness layer. Applicant interprets Kobayashi to disclose that this operation chokes off the honeycomb so that the honeycomb is punched with some sort of holes. Applicant asserts that Duncombe coats the walls of the ceramic catalyst at the wall surface. Applicant concludes that said references teach the disposition of the catalyst on the outer surface of the walls. Applicant argues that the instant invention requires the catalyst to be deposited within the wall of the honeycomb to see the allegedly surprising results of improved catalytic activity arising from the discovery that a liquid reactant can have a substantial static fraction penetrating the walls in a liquid reaction method. Applicant asserts that the cited prior art teaches away from such a configuration because the references fail to describe or even recognize that a liquid can even substantially penetrate the wall in a liquid flow through reactor much less to think to coat ceramic grains within the wall with the catalyst to take advantage of the present invention.

Responding to Applicant's argument regarding Bliss, Bliss is relevant to Duncombe and Kobayashi because Bliss relates to flow through reactors having catalysts disposed thereon wherein said catalyst interacts with a substance in the material that flows through the reactor. That Bliss teaches that the material that flows through is a gas and not a liquid does not exclude the reference as relevant prior art because all of the references are directed to flow through reactors having catalysts disposed thereon wherein substances in the material that flows through the reactor interact with the catalyst disposed on the honeycomb walls. Thus, the physical state of

the material that flows through the reactor is not the crux of the disclosure. The physical state of the material that flows through is just a carrier of the substance that interacts with the catalyst. What is important is that Bliss teaches that typical wall pore size for these types of flow through reactors ranges between about 0.1 to 100 micrometers, preferably between about 1 to 40 micrometers while the wall porosity typically ranges between about 15-70%, preferably between about 25 to 50% (paragraph [0019]). The disclosure of the pore sizes by Bliss overlaps the claimed range of 5 micrometers or more. The porosity disclosed by Bliss overlaps the claimed range of 50% or more (now in instant claim 1).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., that the catalyst needs to be deposited within the wall of the honeycomb to see the allegedly surprising results) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Instant claim 1 only recites that "porous partition was having a catalyst disposed thereon". None of the claims recite that the catalyst is deposited within the wall of the honeycomb.

Regarding Applicant's argument regarding Kobayashi, even if the honeycomb is punches with holes, these holes represent the porous parts of the honeycomb and the ordinary artisan would seek to optimize the pores and porosity according to Bliss since

Bliss teaches that his disclosed pore size and porosity is typical for flow through reactors.

***New Grounds of Objection and Rejection Due to Claim Amendments***

***Claim Objections***

Claim 2 is objected to because of the following informalities: Claim 2 now appears to have three period marks. Appropriate correction is required.

Claims 9 and 18-20 are objected to because they have incorrect status identifiers. The status identifiers for these claims should be "withdrawn".

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 2 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 2 is now drawn to the method of claim 1 wherein the "catalyst essentially covers all of the grains of the porous walls the activity of the catalyst is at least 5% greater per gram of catalyst compared to a ceramic honeycomb having catalyst on the surface of the wall. The recitation that the catalyst essentially covers all of the grains of the porous material is New Matter. The only reference to the

catalyst with respect to the grains is found in the specification on page 7, lines 1-6, wherein the catalyst may be surface-bound to at least a portion of the ceramic grains.

Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 is rejected because "the grains" lacks antecedent basis in claim 1.

Claim 2 is rejected because the phrase "grains of the porous partition walls the activity of the catalyst" is confusing. The phrase appears to be missing some words to connect the coverage of the grains by the catalyst and the activity of the catalyst.

***Claim Rejections - 35 USC § 103***

Claims 1, 3-8 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Duncombe et al (US 4,430,348), Kobayashi (Sho58-150322; cited in the IDS filed 01/22/2007) and Bliss et al. (US 2005/0159308), as applied to claims 1, 3-8, 12 and 13 above, in view of van den Broecke et al. (WO 02/33048).

The combined disclosures by the combination of Duncombe, Kobayashi and Bliss are discussed supra.

The combined disclosures do not teach that one of the reactants is a gas that is bubbled concurrently with the liquid.

van den Broecke teaches that fermentation processes involve the culturing of microorganisms, including yeast, and require a supply of oxygen for the aerobic metabolism of said microorganisms. Hence, oxygen is a reactant since the

microorganisms require it for the fermentation process (instant claim 10). Usually the oxygen is supplied by passing an oxygen-containing gas such as air, though the liquid in the fermentation vessel. The oxygen is transferred from the gas bubbles (instant claim 11) to the liquid phase thus allowing its uptake by the microorganism (page 1, lines 6-14).

It would have been obvious to one of ordinary skill in the art, a biochemist, at the time the invention was made to supply oxygen in the form of air to the yeast in the enzyme bioreactor of the combined disclosures by bubbling it into said bioreactor. The ordinary artisan would have been motivated to do so in order to optimize the reaction between the limit dextrose and the immobilized glucoamylase. The ordinary artisan would have realized that oxygen is essential for the metabolic fermentation by the circulating yeast in order to produce the limit dextran. The ordinary artisan would have had a reasonable expectation that bubbling air through the enzyme reactor of the combined disclosures would aid in the fermentation and subsequent reaction of the products of the fermentation by the immobilized glucoamylase because microorganisms are known to have an obligate requirement for oxygen for the fermentation process.

Claims 1, 3-8, 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (Sho58-150322; cited in the IDS filed 01/22/2007) and Bliss et al. (US 2005/0159308), as applied to claims 1, 3-8, 12 and 13 above, in view of van den Broecke et al. (WO 02/33048).

The combined disclosure by Kobayashi and Bliss is discussed supra.



The combined disclosure does not teach that one of the reactants is a gas that is bubbled concurrently with the liquid.

The disclosure by van den Broecke is discussed supra.

It would have been obvious to one of ordinary skill in the art, a biochemist, at the time the invention was made to supply oxygen in the form of air to the yeast in the microorganism bioreactor of the combined disclosures by bubbling it into said bioreactor. The ordinary artisan would have been motivated to do so in order to optimize the reaction between the glucose and the immobilized yeast. The ordinary artisan would have realized that oxygen is essential for the fermentation by the immobilized yeast in order to produce the ethanol. The ordinary artisan would have had a reasonable expectation that bubbling air through the microorganism reactor of the combined disclosures would aid in the fermentation because microorganisms are known to have an obligate requirement for oxygen for the fermentation process.

Claims 1, 3-8, 12-14, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Duncombe et al. (US 4,430,348), Kobayashi (Sho58-150322; cited in the IDS filed 01/22/2007) and Bliss et al. (US 2005/0159308), as applied to claims 1, 3-8, 12 and 13 above, in view of Shiraishi (Hei 5-273119; cited in the IDS filed 1/22/07; translation).

The combined disclosures by the combination of Duncombe, Kobayashi and Bliss is discussed supra.

The combined disclosures do not teach that the monolithic ceramic honeycomb is an acicular ceramic such as acicular mullite.

Shiraishi discloses that mullite is suitable for the attachment of enzymes or microorganisms or enzymes for such a carrier. Chitosan film is easily bonded to the ceramic carrier with strong adhesion in order to support the microorganism or enzyme (page 2 of the translation, under the heading "Constitution"). The mullite is in a turf-like state that is grown from needle (acicular) crystals in a highly dense state (page 2 of the translation under claim 2). The resulting ceramic carrier can support a thin film which is outstanding for the permeability of liquids (page 4, paragraph [0004]. Glucoamylase was successfully attached to said acicular mullite covered with chitosan. The fixed enzyme successfully converted starch into glucose (Example 3, page 5 of the translation).

It would have been obvious to one of ordinary skill in the art, a biochemist, to make the honeycomb ceramic monolith of the combined disclosures out of acicular mullite. The ordinary artisan would have been motivated to do so because the adhesion of enzymes via chitosan to the acicular mullite provides a dense surface that supports the enzymes which is outstanding for the permeability of liquids. The ordinary artisan would have had a reasonable expectation that the enzymes would be active when attached to acicular mullite because Shiraishi teaches that fixed glucoamylase was able to convert starch into glucose.

Claims 1, 3-8, 12-14, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (Sho58-150322; cited in the IDS filed 01/22/2007) and

Bliss et al. (US 2005/0159308), as applied to claims 1, 3-8, 12 and 13 above, in view of Shiraishi (Hei 5-273119; cited in the IDS filed 1/22/07; translation)

The combined disclosure by Kobayashi and Bliss is discussed supra.

The combined disclosure does not teach that monolithic ceramic honeycombed is an acicular ceramic such as acicular mullite.

The disclosure by Shiraishi is discussed supra.

It would have been obvious to one of ordinary skill in the art, a biochemist, to make the honeycomb ceramic monolith of the combined disclosure out of acicular mullite. The ordinary artisan would have known from Shiraishi that microorganisms, like enzymes can be fixed onto ceramics via a polysaccharide. The ordinary artisan would have been motivated to make the honeycomb ceramic monolith of the combined disclosure out of acicular mullite because the adhesion of microorganisms via a polysaccharide to the acicular mullite provides a dense surface that supports the microorganisms which is outstanding for the permeability of liquids. The ordinary artisan would have had a reasonable expectation that the microorganisms would be active when attached to acicular mullite because Shiraishi teaches that fixed glucoamylase was able to convert starch into glucose and the combined disclosure teaches that microorganisms attached to ceramics are active.

Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **SUSAN HANLEY** whose telephone number is (571)272-2508. The examiner can normally be reached on M-F 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached on 571-272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sandra Saucier/  
Primary Examiner, Art Unit 1651

/Susan Hanley/  
Examiner, Art Unit 1651